

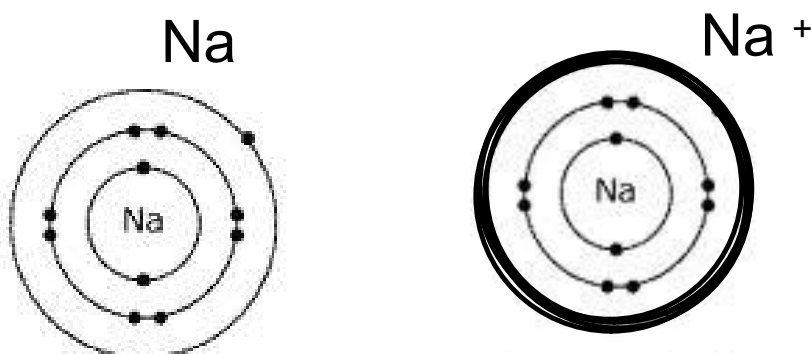
# Stability of Atoms-

## How they become ions

- **Metals** tend to **lose** (give away) electrons and **non-metals** tend to **gain** (accept) electrons when they come into contact with another element

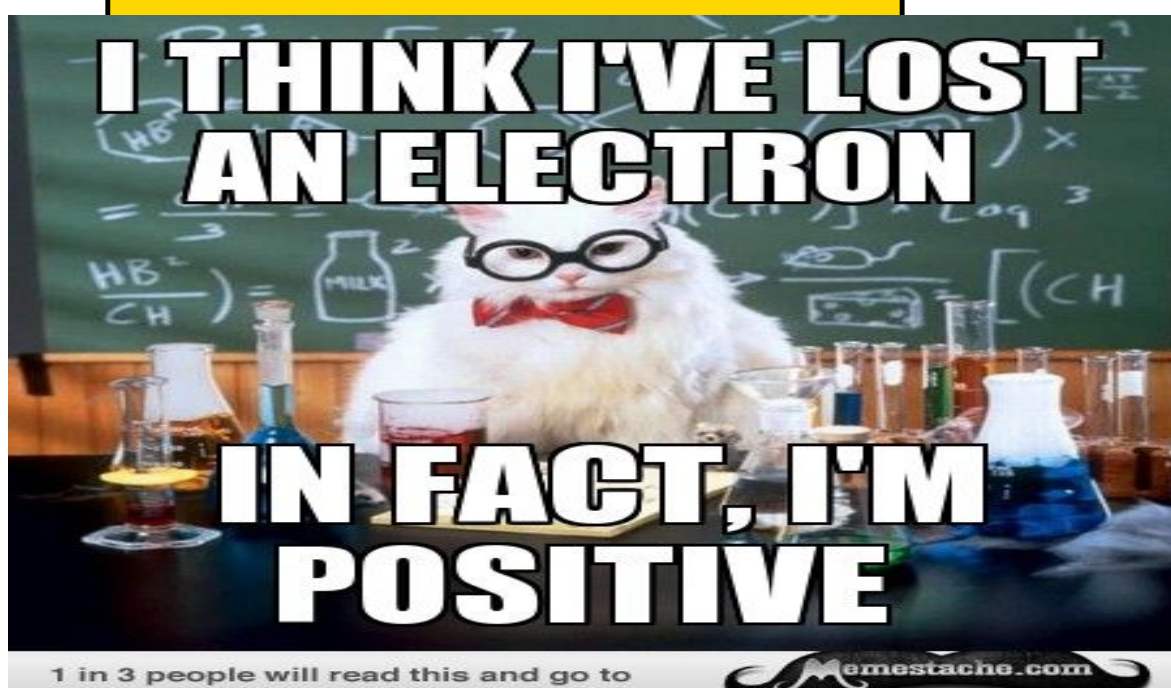
### Example: Sodium ion

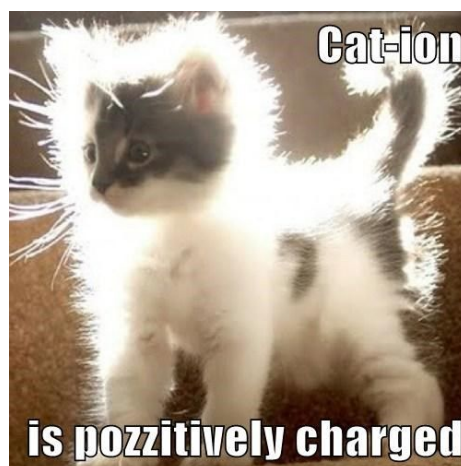
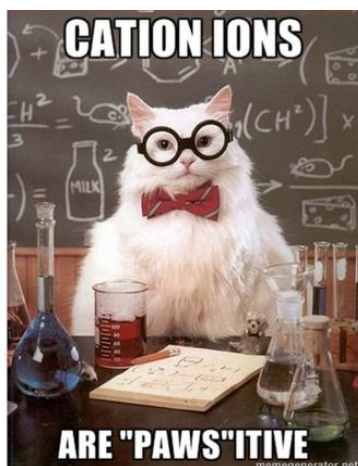
- Sodium (Na) is a **metal (loses electrons)**
- When sodium (Na) loses one electron, it becomes a sodium ion ( $\text{Na}^+$ )



Stable

Unstable





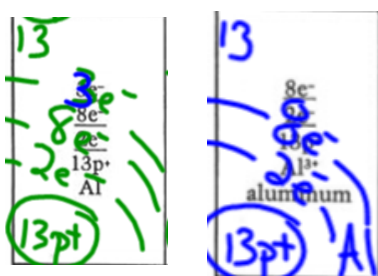
## Ions:

-When atoms no longer have an equal number of protons and electrons

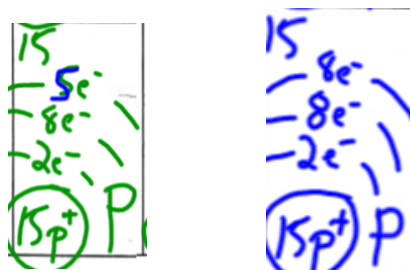
-Have either a positive or negative charge.

Positive Cations      Negative Anions

Example:  $\text{Al}^{3+}$



Example:  $\text{P}^{3-}$



1. How many protons does oxygen have?
2. How many valence electrons does oxygen have?
3. Will oxygen gain or lose electrons?
4. Draw a Bohr diagram for an oxygen ion.

4

## ELECTRON ENERGY-LEVEL DIAGRAMS FOR IONS

IONS

ELECTRON ENERGY-LEVEL DIAGRAMS FOR IONS

IONS

1	
	H

IA

2  
IIA

1	
	H

18

H

17  
VIIA

VIIIA

3	4
Li	Be
11	12
Na	Mg
19	20
K	Ca

13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
		7	8	9	
		N	O	F	
13		15	16	17	
8e <sup>-</sup> 2e <sup>-</sup> 13p <sup>+</sup> Al <sup>3+</sup> aluminum		P	S	Cl	

**4** ELECTRON ENERGY-LEVEL DIAGRAMS FOR IONS

IONS

1 1 <sup>+</sup>	2 2 <sup>+</sup>	3 3 <sup>+</sup>	14 IVA	15 VA	16 VIA	17 VIIA	18 0
1 1p <sup>+</sup> H						1 1p <sup>+</sup> H	
3 3p <sup>+</sup> Li	4 4p <sup>+</sup> Be			7 7p <sup>+</sup> N	8 8p <sup>+</sup> O	9 9p <sup>+</sup> F	
11 11p <sup>+</sup> Na	12 12p <sup>+</sup> Mg	13 13p <sup>+</sup> Al aluminum		15 15p <sup>+</sup> P	16 16p <sup>+</sup> S	17 17p <sup>+</sup> Cl	
19 19p <sup>+</sup> K	20 20p <sup>+</sup> Ca						